Safira, N., 2018. Pengaruh Penambahan Konsorsium Mikroba, *Bulking Agent* (Sekam Padi), dan Nutrien Anorganik terhadap Biodegradasi *Oil Sludge* Menggunakan Reaktor *Biopile*. Skripsi ini di bawah bimbingan Dr. Ni'matuzahroh dan Prof. Dr. Ir. Agoes Soegianto, DEA. Program Studi S1 Teknik Lingkungan, Departemen Biologi, Fakultas Sains dan Teknologi, Universitas Airlangga.

ABSTRAK

Lumpur minyak merupakan salah satu bentuk *hydrocarbon sludge* yang berasal dari industri pengilangan minyak yang memerlukan penanganan dan pemanfaatan. Upaya penanggulangan pencemaran minyak telah banyak dilakukan diantaranya adalah teknik *biopile*. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh variasi penambahan konsentrasi konsorsium mikroba, *bulking agent* (sekam padi), nutrien anorganik dan lama waktu inkubasi terhadap jumlah total mikroba (CFU/mL), penurunan berat residu TPH *oil sludge* (g/g), dan pH pada biodegradasi dengan meggunakan reaktor *biopile*. Rancangan penelitian ini menggunakan Rancangan Acak Lengkap (RAL) faktorial 6x4. Variasi perlakuan yang digunakan adalah *oil sludge* + tanah subur, *oil sludge* + tanah subur + konsorsium mikroba, *oil sludge* + tanah subur + *bulking agent*, *oil sludge* + tanah subur + nutrien anorganik, *oil sludge* + tanah subur + *bulking agent* + konsorsium, dan *oil sludge* + tanah subur + *bulking agent* + konsorsium mikroba + nutrien anorganik. Lama waktu inkubasi yang digunakan adalah 0, 7, 14 dan 21 hari. TPH (*Total Petroleum Hydrocarbon*) awal yaitu sebesar 0,43505 g/g. Parameter yang diukur yaitu jumlah total mikroba (CFU/mL), penurunan berat residu TPH *oil sludge* (g/g), dan pH. Data rata-rata jumlah total mikroba (CFU/mL) dan penurunan berat residu TPH *oil sludge* (g/g) diuji dengan menggunakan *One Way* ANOVA (α=0,05) dan dilanjutkan dengan uji *Duncan*. Hasil penelitian menunjukkan variasi konsentrasi konsorsium mikroba dan lama waktu inkubasi berpengaruh terhadap jumlah total mikroba (CFU/mL) dan penurunan berat *oil sludge* (g/g). Kombinasi terbaik adalah V4 pada waktu inkubasi hari ke-14 dengan log jumlah total mikroba (CFU/mL) sebesar 7,88±0,38 dan berat residu TPH sebesar 0,11±0,08, serta pH senilai 7,67±0,29.

Kata kunci: Biodegradasi, lumpur minyak, reaktor *Biopile*, *bulking agent*, nutrien anorganik.

Safira, N., 2018. The effects of adding Microbial Consortium, Bulking Agent (Rice Husk), and Inorganic Nutrient on Oil Sludge Biodegradation using Biopile Reactor. This Thesis was supervised by Dr. Ni'matuzahroh and Prof. Dr. Ir. Agoes Soegianto, DEA. Study Program of Environmental Engineering, Department of Biology, Faculty of Science and Technology, Airlangga University.

ABSTRACT

Oil sludge is a form of hydrocarbon sludge that come from oil refining industry that needs to be treated and used well. There are a lot of attempt to prevent oil pollution, one of them is biopile. This study was to know the effects of variation of adding microbial consortium, bulking agent (rice husk), inorganic nutrient and length of incubation time on total microbial (CFU/mL) and reduction of residual weight of hydrocarbon in oil sludge (g/g) on biodegradation using biopile reactor. The design of this research is Complete Randomized Design 6x4. The variations are oil sludge + soil, oil sludge + soil + microbial consortium, oil sludge + soil + bulking agent, oil sludge + soil + inorganic nutrient, oil sludge + soil + bulking agent + microbial consortium, and oil sludge + soil + bulking agent + microbial consortium + inorganic nutrient. Length of time for the incubation are 0, 7, 14 and 21 days. TPH (Total Petroleum Hydrocarbon) initially was as much as 0,43505 g/g. Parameters measured were total microbial (CFU/mL), reduction of residual weight of hydrocarbon in oil sludge (g/g), and pH. The mean data of total microbial count (CFU/mL), hydrocarbon residual in oil sludge (g/g) and pH were tested using One Way ANOVA (a=0,05) and continued with Duncan Test. The results showed that the concentration of microbial consortium and incubation time had an effect on total microbial (CFU/mL) and hydrocarbon residual in oil sludge (g/g). The best combination was found in the V4 on day 14th with total microbial as much as 7,88±0,38 (CFU/mL), final TPH 0,11±0,08 (g/g), and pH 7,67±0,29.

Key Word: *Biodegradation, oil sludge, Biopile reactor, bulking agent, inorganic nutrient.*